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^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from refere e category ($p < 0.05$)

Unintentional injury hospitalizations among children and youth in areas with a high percentage of Aboriginal identity residents: 2001/2002 to 2005/2006

by Lisa N. Oliver and Dafna E. Kohen

Abstract

Background

Because administrative data typically do not contain Aboriginal identifiers, national unintentional injury hospitalization rates among Aboriginal children have not been reported. This study examines rates of unintentional injury hospitalization for children in areas with a high-percentage Aboriginal identity population.

Data and Methods

Data are from the Hospital Morbidity Database (2001/2002 to 2005/2006). Rates of unintentional injury hospitalization were calculated for 0- to 19-year-olds in census Dissemination Areas (DAs) where at least 33% of residents reported an Aboriginal identity. DAs were classified as high-percentage First Nations, Métis or Inuit identity based on the predominant group.

Results

Unintentional injury hospitalization rates of children and youth in high-percentage Aboriginal identity areas were at least double the rate for their contemporaries in low-percentage Aboriginal identity areas. Falls and land transportation were the most common causes of unintentional injury hospitalization, regardless of Aboriginal identity status, but disparities between rates for high- and low-percentage Aboriginal identity areas were often greatest for less frequent causes, such as fire, natural/environmental, and drowning/suffocation.

Interpretation

The geographic areas where children live were associated with hospitalization rates for injury.

Keywords

Child health, drowning, hospital records, Inuit, Métis, poisoning, trauma

Authors

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Unintentional injury is the leading cause of death[1] and morbidity[2] among Canadian children. Not only are injuries associated with increased health care costs, hospitalizations and physician care,[3] but injuries sustained in childhood also have consequences that can last throughout the life-course.[4] For these reasons, childhood injuries have been identified as a public health issue. Among Aboriginal children, in particular, injury rates have been reported to be relatively high.[5-7]

Canadian studies of injury in Aboriginal populations have largely focused on adults.[8,9] Most studies of hospitalization due to injury have been restricted by the lack of Aboriginal identifiers on hospitalization records. To address this problem, some researchers have adopted a geographic approach and examined hospitalizations in areas that have a high percentage of Aboriginal residents.[10-12] These studies reported higher rates of injury hospitalization for people living in such areas.

While there are limitations to a geographic approach, the present analysis examines hospitalizations for unintentional injury among children and youth in communities where at least 33% of residents reported Aboriginal identity. The purposes are to: (1) calculate rates of unintentional injury hospitalization by cause for areas with a relatively high percentage of First Nations, Métis, and Inuit identity residents, and (2) compare those rates with rates for children and youth in areas with a low percentage of Aboriginal identity residents.

Methods

The data are from the 2001/2002 to 2005/2006 Hospital Morbidity Database (HMDB), which contains discharge records for all hospital separations in Canada. For each separation, information on the patient's age, sex, residential postal code, and diagnoses is available.

This analysis pertains only to acute-care facilities. The data represent the number of hospital separations, not

the number of individuals (a single individual may have been hospitalized more than once). Multiple diagnoses may be listed on discharge records; the presence of at least one diagnosis of unintentional injury made the record eligible for inclusion in this analysis.

Unintentional injuries are those for which there was no intent to harm; adverse effects due to drugs or medical care are excluded. The International Classification of Diseases (ICD) was used to classify unintentional injuries based on the external cause of the injury. The version of the ICD codes submitted by each province and recorded on the HMDB were used for this analysis. Causes of injury hospitalizations were grouped based on the International Collaborative Effort on Injury Statistics[13]: falls, land transportation, motor vehicle traffic (subset of land transportation), being struck, being cut/pierced, natural/environmental, poisoning, fire (includes hot substances), drowning/suffocation, and other.

Residential postal codes on individual hospital separation records were linked to census Dissemination Areas (DAs) via the Postal Code Conversion File.[14] Because discharge records for Quebec contain only the first three digits of the six-digit postal code, they were excluded from this study.

DAs where at least 33% of residents reported an Aboriginal identity to the 2001 Census were considered to be "high-percentage Aboriginal identity" areas.[10,15] These DAs were further classified as First Nations, Métis or Inuit identity areas, based on the *predominant* Aboriginal identity group in the DA. On average, predominant First Nations DAs had 76% First Nations identity; predominant Métis DAs, 38% Métis identity; and predominant Inuit DAs, 79% Inuit identity. All other DAs were designated low-percentage Aboriginal identity areas. Excluding Quebec, there were 1,862 predominant First Nations identity DAs, 135 predominant Métis identity DAs, 69 predominant Inuit identity DAs, and 38,774 low-percentage Aboriginal identity DAs.

The denominator for hospitalization rates was derived from the 2001 and 2006 Censuses. The denominator was the sum of the interpolated populations (aged 0 to 19) for each of the five years of hospitalization data (2001/2002 to 2005/2006, excluding Quebec) and was based on the midpoint (October) of the fiscal year (April to March). For the 2002/2003 fiscal year, Nunavut did not submit hospital separation data, and the population count for this year was excluded.

Because of small populations, global non-response, or incompletely enumerated Indian Reserves, a small number of DAs lacked the detailed age and sex data needed to provide a complete denominator. To retain these DAs in the sample, age and sex were estimated from total population counts or population estimates of incompletely enumerated Indian Reserves.

Valid cases of unintentional injury hospitalization for this analysis totalled 117,605. Because of invalid or missing postal codes, 3,320 unintentional injury hospitalizations were excluded, and another 327 were excluded owing to insufficient census information at the DA level.

Hospitalization rates were age-standardized to the Aboriginal identity population based on the 2001 Census. Age-standardized hospitalization rates (ASHRs) per 10,000 person-years at risk and rate ratios (RRs) for those in high-percentage First Nations, Métis and Inuit identity areas, compared with those in low-percentage Aboriginal identity areas, were calculated. ASHRs and RRs were calculated by sex, age group (0 to 9 and 10 to 19), and cause of injury. Confidence intervals were based

Table 1
Number and percentage distribution of hospitalizations for unintentional injury and crude rate, by sex, age group, Dissemination Area reporting Aboriginal identity, and cause of injury, population aged 0 to 19, Canada (excluding Quebec), 2001/2002 to 2005/2006

	Hospitalizations		Crude rate per 10,000 person-years at risk
	Number	%	
Total	**117,605**	**100.0**	**39.4**
Sex			
Male	77,960	66.3	50.9
Female	39,645	33.7	27.2
Age (years)			
0 to 9	46,954	39.9	33.9
10 to 19	70,651	60.1	44.1
Type of Dissemination Area			
High % First Nations	6,712	5.7	86.2
High % Métis	828	0.7	89.2
High % Inuit	546	0.5	83.3
Low % Aboriginal	109,519	93.1	37.8
Cause of injury†			
Falls	43,713	37.2	14.6
Land transportation	29,076	24.7	9.7
Motor vehicle traffic	13,842	11.8	4.6
Struck	13,400	11.4	4.5
Poisoning	6,647	5.7	2.2
Cut/Pierce	3,499	3.0	1.2
Fire	3,010	2.6	1.0
Natural/Environmental	2,920	2.5	1.0
Drowning/Suffocation	1,683	1.4	0.6
Other	14,524	12.3	4.9

† because multiple injuries were recorded, causes add to more than total

Notes: Dissemination Areas where at least 33% of the population reported Aboriginal identity are classified as high-percentage Aboriginal identity. Classification as high-percentage First Nations, Métis or Inuit identity is based on the predominant group.

Source: 2001/2002 to 2005/2006 Hospital Morbidity Database.

on a Poisson distribution. A t-test was used to determine if unintentional injury hospitalization rates for high-percentage First Nations, Métis, and Inuit identity areas differed significantly from rates for low-percentage Aboriginal identity areas ($p<0.05$). All statistical analyses were performed using SAS version 9.1.

Results

Hospitalization rates

From 2001/2002 through 2005/2006, Canadian hospitals (excluding Quebec) recorded 117,605 separations of children and youth aged 0 to 19 for unintentional injury (Table 1). Two-thirds of these hospitalizations were of males, and 60% were of 10- to 19-year-olds.

Overall, the crude unintentional injury hospitalization rate for the population aged 0 to 19 was 39.4 per 10,000 person-years at risk. Rates were considerably higher among children and youth in DAs where at least a third of the population reported Aboriginal identity: 86.2 per 10,000 person-years at risk in high-percentage First Nations identity areas; 89.2 in high-percentage Métis identity areas; and 83.3 in high-percentage Inuit identity areas.

When the rates were age-standardized to account for the different age distributions of each group, patterns were similar (Table 2). The age-standardized unintentional injury hospitalization rate (ASHR) for 0- to 19-year-olds was 37.1 per 10,000 person-years at risk in low-percentage Aboriginal identity areas, compared with 85.9 in high-percentage First Nations identity areas, 88.2 in high-percentage Métis identity areas, and 83.0 in high-percentage Inuit identity areas.

Rate ratios (RRs) were calculated to compare unintentional injury hospitalization rates in the three types of high-percentage Aboriginal identity areas with the rates for the low-percentage Aboriginal identity areas. RRs in the high-percentage Aboriginal identity areas ranged from 2.2 to 2.4; that is, ASHRs in these areas were more than twice those in low-percentage Aboriginal identity areas.

Table 2
Number of hospitalizations for unintentional injury, age-standardized rate, and rate ratio, by cause of injury and Dissemination Area reporting Aboriginal identity, population aged 0 to 19, Canada (excluding Quebec), 2001/2002 to 2005/2006

Cause of injury and type of Dissemination Area	Number	Age-standardized rate (per 10,000 person-years at risk)	95% confidence interval		Rate ratio	95% confidence interval	
			from	to		from	to
Total							
High % First Nations	6,712	85.9*	83.9	88.0	2.3	2.3	2.4
High % Métis	828	88.2*	82.4	94.5	2.4	2.2	2.6
High % Inuit	546	83.0*	76.3	90.3	2.2	2.1	2.4
Low % Aboriginal	109,519	37.1	36.8	37.3	1.0	...	...
Falls							
High % First Nations	2,223	28.7*	27.6	29.9	2.0	1.9	2.1
High % Métis	267	29.0*	25.7	32.7	2.0	1.8	2.3
High % Inuit	150	23.1*	19.7	27.1	1.6	1.4	1.9
Low % Aboriginal	41,073	14.4	14.3	14.5	1.0	...	...
Land transportation							
High % First Nations	1,694	21.5*	20.5	22.6	2.5	2.4	2.6
High % Métis	251	26.1*	23.0	29.5	3.0	2.7	3.4
High % Inuit	178	27.0*	23.3	31.3	3.1	2.7	3.6
Low % Aboriginal	26,953	8.6	8.5	8.7	1.0	...	...
Motor vehicle traffic							
High % First Nations	797	10.1*	9.4	10.8	2.5	2.3	2.7
High % Métis	88	9.0*	7.3	11.1	2.3	1.8	2.8
High % Inuit	59	8.9*	6.9	11.5	2.2	1.7	2.9
Low % Aboriginal	12,898	4.0	3.9	4.1	1.0	...	...
Struck							
High % First Nations	552	7.0*	6.5	7.7	1.7	1.6	1.9
High % Métis	81	8.5*	6.8	10.6	2.0	1.6	2.6
High % Inuit	40	6.1*	4.5	8.3	1.5	1.1	2.0
Low % Aboriginal	12,727	4.1	4.1	4.2	1.0	...	...
Poisoning							
High % First Nations	558	7.1*	6.5	7.7	3.3	3.1	3.6
High % Métis	44	4.9*	3.6	6.6	2.3	1.7	3.1
High % Inuit	31	4.6*	3.2	6.5	2.2	1.5	3.1
Low % Aboriginal	6,014	2.1	2.1	2.2	1.0	...	...
Cut/Pierce							
High % First Nations	251	3.2*	2.8	3.6	3.0	2.7	3.5
High % Métis	33	3.5*	2.5	5.0	3.4	2.4	4.8
High % Inuit	17	2.6*	1.6	4.2	2.5	1.5	4.0
Low % Aboriginal	3,198	1.0	1.0	1.1	1.0	...	...
Fire							
High % First Nations	305	3.9*	3.5	4.4	4.1	3.6	4.6
High % Métis	22	2.4*	1.6	3.7	2.5	1.7	3.9
High % Inuit	10	1.5	0.8	2.8	1.6	0.8	2.9
Low % Aboriginal	2,673	1.0	0.9	1.0	1.0	...	...
Natural/Environmental							
High % First Nations	265	3.4*	3.0	3.8	3.7	3.2	4.2
High % Métis	19	2.0*	1.3	3.2	2.2	1.4	3.5
High % Inuit	35	5.3*	3.8	7.4	5.8	4.1	8.1
Low % Aboriginal	2,601	0.9	0.9	1.0	1.0	...	...
Drowning/Suffocation							
High % First Nations	124	1.6*	1.3	1.9	2.8	2.3	3.3
High % Métis	15	1.7*	1.0	2.8	2.9	1.8	4.9
High % Inuit	11	1.7*	0.9	3.0	3.0	1.6	5.3
Low % Aboriginal	1,533	0.6	0.5	0.6	1.0	...	...
Other							
High % First Nations	784	10.0*	9.3	10.7	2.2	2.0	2.4
High % Métis	102	10.7*	8.8	13.0	2.3	1.9	2.8
High % Inuit	77	11.6*	9.3	14.5	2.5	2.0	3.2
Low % Aboriginal	13,561	4.6	4.5	4.7	1.0	...	...

* significantly different from low-percentage Aboriginal identity Dissemination Areas
... not applicable
Notes: Dissemination Areas where at least 33% of the population reported Aboriginal identity are classified as high-percentage Aboriginal identity. Classification as high-percentage First Nations, Métis or Inuit identity is based on the predominant group.
Source: 2001/2002 to 2005/2006 Hospital Morbidity Database.

Causes of injury

Almost without exception, ASHRs by cause of unintentional injury were significantly higher for children and youth in high-percentage First Nations, Métis, and Inuit identity areas than for their counterparts in low-percentage Aboriginal identity areas.

Falls ranked first as a cause of unintentional injury hospitalization among children and youth, whether they lived in high- or low-percentage Aboriginal identity DAs. This category includes falls on one level (for example, on ice) and falling off an object (for example, furniture). In high-percentage Aboriginal identity areas, ASHRs for injury due to falls ranged from 23.1 to 29.0 per 10,000 person-years at risk, compared with 14.4 in low-percentage Aboriginal identity areas.

Land transportation, the second most prevalent cause of unintentional injury hospitalizations among children and youth, involves motorized and non-motorized vehicles, on and off public highways. ASHRs exceeded 20.0 per 10,000 person-years at risk in high-percentage Aboriginal identity areas, compared with 8.6 in low-percentage Aboriginal identity areas.

ASHRs for unintentional injury due to each of the other causes were much lower, never surpassing 8.5 per 10,000 person-years at risk for children and youth in high-percentage Aboriginal identity areas, or 4.1 per 10,000 person-years at risk for those in low-percentage Aboriginal identity areas.

The higher ASHRs for unintentional injuries among children and youth in high-percentage Aboriginal identity areas are reflected in rate ratios (RRs). While overall RRs for unintentional injury hospitalization among those in high-percentage Aboriginal identity areas were a little more than 2.0, for some causes and for some high-percentage Aboriginal identity group areas, RRs approached or exceeded 3.0. This was the case for injuries due to land transportation (high-percentage Métis and Inuit identity areas) drowning/suffocation (all high-percentage Aboriginal identity areas), cut/pierce (high-percentage First Nations and Métis identity areas), and poisoning (high-percentage First Nations identity areas). Moreover, RRs for hospitalizations due to injury from fire and natural environmental causes were 4.1 and 3.7, respectively, for children and youth in high-percentage First Nations identity areas, and close to 6.0 for injuries related to natural/environmental causes in high-percentage Inuit areas.

Hospitalization rates vary by age group

ASHRs for total unintentional injuries varied by age group and were generally higher among 10- to 19-year-olds than among children aged 0 to 9. For example, in high-percentage Métis identity areas, the ASHR at ages 10 to 19 was 100.4 per 10,000 person-years at risk, compared with 76.9 at ages 0 to 9 (Table 3). In low-percentage Aboriginal identity areas, the corresponding rates were 42.2 and 32.2. However, this general pattern masks considerable age differences by cause of injury.

For unintentional injuries due to falls, poisoning, fire, natural/environmental causes and drowning/suffocation, ASHRs were higher at ages 0 to 9 than at ages 10 to 19. By contrast, ASHRs for unintentional injuries due to land transportation, being struck, and being cut/pierced were higher at ages 10 to 19.

At ages 0 to 9, RRs compared with children in low-percentage Aboriginal identity areas were particularly high (approximately 3.0) for injuries due to land transportation (high-percentage First Nations and Métis identity areas), poisoning (high-percentage First Nations identity areas), fire (high-percentage First Nations identity areas), natural environment (high-percentage First Nations and Inuit identity areas), and drowning/suffocation (high-percentage First Nations and Métis identity areas).

At ages 10 to 19, RRs in high-percentage First Nations identity areas were 3.0 or more for hospitalization for unintentional injuries due to poisoning, being cut/pierced, fire, and natural/environmental causes. RRs were also 3.0 or more for hospitalization for unintentional injury due to land transportation in high-percentage Métis and Inuit identity areas. As well, in high-percentage Inuit identity areas, the RR for hospitalization for unintentional injuries due to natural/environmental causes was 7.8.

Higher rate ratios for females

Regardless of whether an area was designated high- or low-percentage Aboriginal identity, ASHRs for unintentional injury were generally higher among males than females

What is already known on this subject?

- Unintentional injury is the leading cause of death and morbidity among Canadian children.
- Studies of injury in Aboriginal populations have tended to focus on adults.
- Little is known about injury hospitalization rates among Aboriginal children.

What does this study add?

- For most causes of unintentional injury, rates of hospitalization are higher for children and youth in areas with a high-percentage (33% or more) of Aboriginal identity residents, compared with those in low-percentage Aboriginal identity areas.
- Unintentional injury hospitalization rates for children and youth differed among high-percentage First Nations, Métis and Inuit identity areas.
- While hospitalization rates were higher among males, for many causes of unintentional injury, the disparity between high- and low-percentage Aboriginal identity areas was greater among females.

Table 3
Age-standardized hospitalization rate and rate ratio for unintentional injury, by age group, cause of injury and Dissemination Area reporting Aboriginal identity, population aged 0 to 19, Canada (excluding Quebec), 2001/2002 to 2005/2006

Cause of injury and type of Dissemination Area	Ages 0 to 9						Ages 10 to 19					
	Age-standardized rate (per 10,000 person-years at risk)	95% confidence interval		Rate ratio	95% confidence interval		Age-standardized rate (per 10,000 person-years at risk)	95% confidence interval		Rate ratio	95% confidence interval	
		from	to		from	to		from	to		from	to
Total												
High % First Nations	83.8*	81.0	86.7	2.6	2.5	2.7	88.2*	85.3	91.2	2.1	2.0	2.2
High % Métis	76.9*	69.2	85.4	2.4	2.1	2.7	100.4*	91.8	109.8	2.4	2.2	2.6
High % Inuit	66.7*	58.5	76.1	2.1	1.8	2.4	100.5*	90.1	112.0	2.4	2.1	2.7
Low % Aboriginal	32.2	31.9	32.5	1.0	..	..	42.2	41.9	42.6	1.0	..	..
Falls												
High % First Nations	33.9*	32.1	35.7	2.2	2.1	2.3	23.2*	21.7	24.8	1.7	1.6	1.9
High % Métis	33.1*	28.2	38.9	2.1	1.8	2.5	24.6*	20.5	29.5	1.9	1.5	2.2
High % Inuit	24.8*	20.0	30.8	1.6	1.3	2.0	21.2*	16.7	26.9	1.6	1.3	2.0
Low % Aboriginal	15.5	15.3	15.7	1.0	..	..	13.3	13.1	13.5	1.0	..	..
Land transportation												
High % First Nations	11.9*	10.8	13.0	3.0	2.7	3.3	31.9*	30.2	33.8	2.4	2.2	2.5
High % Métis	12.8*	9.9	16.6	3.2	2.5	4.2	40.3*	35.0	46.4	3.0	2.6	3.4
High % Inuit	10.1*	7.2	14.2	2.5	1.8	3.6	45.0*	38.3	53.0	3.3	2.8	3.9
Low % Aboriginal	4.0	3.9	4.1	1.0	..	..	13.5	13.3	13.7	1.0	..	..
Motor vehicle traffic												
High % First Nations	4.7*	4.1	5.5	2.9	2.5	3.4	15.8*	14.6	17.1	2.4	2.2	2.6
High % Métis	3.8*	2.3	6.0	2.3	1.4	3.8	14.7*	11.7	18.6	2.2	1.8	2.8
High % Inuit	3.4*	1.9	6.1	2.1	1.2	3.8	14.9*	11.2	19.8	2.3	1.7	3.0
Low % Aboriginal	1.6	1.5	1.7	1.0	..	..	6.6	6.4	6.7	1.0	..	..
Struck												
High % First Nations	4.9*	4.2	5.6	2.3	2.0	2.6	9.4*	8.5	10.4	1.5	1.3	1.7
High % Métis	4.9*	3.2	7.4	2.3	1.5	3.5	12.4*	9.6	16.0	2.0	1.5	2.5
High % Inuit	3.6	2.1	6.4	1.7	1.0	3.0	8.7	6.0	12.6	1.4	1.0	2.0
Low % Aboriginal	2.1	2.1	2.2	1.0	..	..	6.3	6.2	6.4	1.0	..	..
Poisoning												
High % First Nations	9.1*	8.2	10.1	3.4	3.1	3.8	4.9*	4.2	5.6	3.2	2.7	3.7
High % Métis	7.3*	5.2	10.3	2.7	1.9	3.9	2.3	1.3	4.1	1.5	0.8	2.7
High % Inuit	5.4*	3.5	8.5	2.0	1.3	3.2	3.7*	2.1	6.5	2.4	1.4	4.3
Low % Aboriginal	2.7	2.6	2.8	1.0	..	..	1.5	1.5	1.6	1.0	..	..
Cut/Pierce												
High % First Nations	2.0*	1.6	2.4	2.7	2.1	3.4	4.5*	3.9	5.2	3.3	2.8	3.8
High % Métis	3.3*	2.0	5.5	4.5	2.7	7.5	3.8*	2.4	6.0	2.7	1.7	4.4
High % Inuit	2.1*	1.0	4.4	2.8	1.3	6.0	3.1*	1.7	5.8	2.3	1.2	4.2
Low % Aboriginal	0.7	0.7	0.8	1.0	..	..	1.4	1.3	1.4	1.0	..	..
Fire												
High % First Nations	5.0*	4.4	5.8	3.9	3.4	4.5	2.7*	2.2	3.3	4.5	3.7	5.6
High % Métis	3.5*	2.2	5.8	2.7	1.7	4.5	1.3	0.6	2.8	2.1	0.9	4.7
High % Inuit	2.3	1.2	4.6	1.8	0.9	3.6	x	..	..	x	..	..
Low % Aboriginal	1.3	1.2	1.4	1.0	..	..	0.6	0.6	0.6	1.0	..	..
Natural/Environmental												
High % First Nations	4.2*	3.6	4.9	3.7	3.1	4.3	2.5*	2.1	3.1	3.7	3.0	4.6
High % Métis	2.2*	1.2	4.1	1.9	1.0	3.6	1.9*	1.0	3.6	2.7	1.4	5.3
High % Inuit	5.4*	3.4	8.5	4.7	2.9	7.4	5.3*	3.3	8.5	7.8	4.8	12.6
Low % Aboriginal	1.2	1.1	1.2	1.0	..	..	0.7	0.6	0.7	1.0	..	..
Drowning/Suffocation												
High % First Nations	2.8*	2.3	3.3	3.1	2.5	3.7	0.3	0.2	0.6	1.4	0.8	2.6
High % Métis	2.7*	1.5	4.7	2.9	1.7	5.2	x	..	..	x	..	..
High % Inuit	2.1*	1.0	4.4	2.3	1.1	4.9	x	..	..	x	..	..
Low % Aboriginal	0.9	0.9	1.0	1.0	..	..	0.2	0.2	0.2	1.0	..	..
Other												
High % First Nations	10.6*	9.6	11.6	2.6	2.3	2.8	9.4*	8.5	10.5	1.9	1.7	2.1
High % Métis	7.5*	5.4	10.5	1.8	1.3	2.6	14.2*	11.2	18.0	2.8	2.2	3.6
High % Inuit	10.6*	7.9	15.0	2.6	1.9	3.6	12.5*	9.1	17.0	2.5	1.8	3.4
Low % Aboriginal	4.1	4.0	4.2	1.0	..	..	5.1	5.0	5.2	1.0	..	..

* significantly different from low-percentage Aboriginal identity Dissemination Areas
.. not applicable
x suppressed to meet confidentiality requirements of Statistics Act
Notes: Dissemination Areas where at least 33% of the population reported Aboriginal identity are classified as high-percentage Aboriginal identity. Classification as high-percentage First Nations, Métis or Inuit identity is based on the predominant group.
Source: 2001/2002 to 2005/2006 Hospital Morbidity Database.

Table 4
Age-standardized hospitalization rate and rate ratio for unintentional injury, by sex, cause of injury and Dissemination Area reporting Aboriginal identity, population aged 0 to 19, Canada (excluding Quebec), 2001/2002 to 2005/2006

	Males						Females					
Cause of injury and type of Disseminatin Area	Age-standardized rate (per 10,000 person-years at risk)	95% confidence interval		Rate ratio	95% confidence interval		Age-standardized rate (per 10,000 person-years at risk)	95% confidence interval		Rate ratio	95% confidence interval	
		from	to		from	to		from	to		from	to
Total												
High % First Nations	103.6*	100.5	106.8	2.2	2.1	2.2	67.4*	64.8	70.0	2.6	2.5	2.7
High % Métis	107.7*	98.8	117.4	2.3	2.1	2.5	68.3*	61.1	76.4	2.6	2.4	2.9
High % Inuit	103.6*	93.2	115.1	2.2	2.0	2.4	61.6*	53.6	70.8	2.4	2.1	2.7
Low % Aboriginal	47.6	47.2	47.9	1.0	..	..	26.0	25.7	26.2	1.0	..	..
Falls												
High % First Nations	34.1*	32.3	35.9	1.9	1.8	2.0	23.1*	21.6	24.7	2.1	2.0	2.3
High % Métis	35.3*	30.4	41.1	2.0	1.7	2.3	22.6*	18.5	27.5	2.1	1.7	2.6
High % Inuit	29.7*	24.3	36.2	1.7	1.4	2.0	16.3*	12.4	21.4	1.5	1.2	2.0
Low % Aboriginal	17.9	17.6	18.1	1.0	..	..	10.8	10.6	10.9	1.0	..	..
Land transportation												
High % First Nations	26.1*	24.5	27.7	2.3	2.1	2.4	16.8*	15.5	18.1	3.0	2.8	3.3
High % Métis	33.5*	28.8	39.1	2.9	2.5	3.4	18.4*	14.9	22.7	3.3	2.7	4.1
High % Inuit	32.5*	26.9	39.2	2.8	2.3	3.4	21.3*	16.8	27.0	3.8	3.0	4.8
Low % Aboriginal	11.5	11.3	11.6	1.0	..	..	5.6	5.5	5.7	1.0	..	..
Motor vehicle traffic												
High % First Nations	10.9*	9.9	11.9	2.3	2.1	2.5	9.2*	8.3	10.2	2.9	2.6	3.3
High % Métis	9.8*	7.4	13.0	2.0	1.5	2.7	8.3*	6.1	11.3	2.6	1.9	3.6
High % Inuit	9.5*	6.7	13.4	2.0	1.4	2.8	8.3*	5.7	12.2	2.6	1.8	3.9
Low % Aboriginal	4.8	4.7	4.9	1.0	..	..	3.2	3.1	3.2	1.0	..	..
Struck												
High % First Nations	10.4*	9.4	11.4	1.6	1.5	1.8	3.6*	3.0	4.2	1.9	1.6	2.3
High % Métis	11.7*	9.0	15.2	1.9	1.4	2.4	5.2*	3.5	7.8	2.8	1.9	4.2
High % Inuit	10.1*	7.2	14.1	1.6	1.1	2.2	1.9	0.8	4.2	1.0	0.5	2.3
Low % Aboriginal	6.3	6.2	6.4	1.0	..	..	1.9	1.8	1.9	1.0	..	..
Poisoning												
High % First Nations	6.7*	5.9	7.5	3.0	2.6	3.4	7.5*	6.7	8.4	3.8	3.4	4.3
High % Métis	4.2*	2.7	6.6	1.9	1.2	2.9	5.6*	3.8	8.2	2.8	1.9	4.2
High % Inuit	4.9*	3.1	7.9	2.2	1.4	3.5	4.2*	2.5	7.2	2.1	1.3	3.6
Low % Aboriginal	2.2	2.2	2.3	1.0	..	..	2.0	1.9	2.1	1.0	..	..
Cut/Pierce												
High % First Nations	4.7*	4.1	5.5	3.1	2.7	3.6	1.6*	1.2	2.0	2.9	2.2	3.7
High % Métis	5.0*	3.4	7.5	3.3	2.2	4.9	2.0*	1.0	3.9	3.7	1.9	7.2
High % Inuit	3.9*	2.3	6.7	2.6	1.5	4.4	x	..	..	x	..	..
Low % Aboriginal	1.5	1.5	1.6	1.0	..	..	0.5	0.5	0.6	1.0	..	..
Fire												
High % First Nations	5.1*	4.5	5.9	4.3	3.7	5.0	2.6*	2.2	3.2	3.7	3.0	4.5
High % Métis	2.6*	1.5	4.5	2.1	1.2	3.8	2.3*	1.3	4.3	3.3	1.7	6.1
High % Inuit	1.7	0.8	3.8	1.4	0.6	3.2	x	..	..	x	..	..
Low % Aboriginal	1.2	1.1	1.3	1.0	..	..	0.7	0.7	0.8	1.0	..	..
Natural/Environmental												
High % First Nations	3.9*	3.4	4.6	3.8	3.3	4.5	2.8*	2.3	3.4	3.4	2.8	4.2
High % Métis	2.3*	1.3	4.1	2.2	1.2	4.0	1.8*	0.9	3.6	2.2	1.1	4.4
High % Inuit	5.0*	3.1	8.1	4.9	3.0	7.9	5.6*	3.5	8.9	6.9	4.3	10.9
Low % Aboriginal	1.0	1.0	1.1	1.0	..	..	0.8	0.8	0.9	1.0	..	..
Drowning/Suffocation												
High % First Nations	1.7*	1.3	2.1	2.4	1.8	3.0	1.5*	1.1	1.9	3.5	2.7	4.6
High % Métis	1.3	0.6	2.8	1.8	0.8	4.0	2.1*	1.1	4.0	4.9	2.5	9.5
High % Inuit	1.8*	0.8	4.0	2.6	1.1	5.7	1.6*	0.6	3.7	3.6	1.5	8.8
Low % Aboriginal	0.7	0.7	0.8	1.0	..	..	0.4	0.4	0.5	1.0	..	..
Other												
High % First Nations	11.8*	10.7	12.9	2.1	1.9	2.3	8.2*	7.4	9.2	2.4	2.1	2.7
High % Métis	12.5*	9.7	16.0	2.2	1.7	2.8	9.0*	6.6	12.2	2.6	1.9	3.5
High % Inuit	14.5*	11.0	19.2	2.6	1.9	3.4	8.6*	5.9	12.5	2.5	1.7	3.6
Low % Aboriginal	5.6	5.5	5.8	1.0	..	..	3.5	3.4	3.6	1.0	..	..

* significantly different from low-percentage Aboriginal identity Dissemination Areas
.. not applicable
x suppressed to meet confidentiality requirements of Statistics Act
Notes: Dissemination Areas where at least 33% of the population reported Aboriginal identity are classified as high-percentage Aboriginal identity. Classification as high-percentage First Nations, Métis or Inuit identity is based on the predominant group.
Source: 2001/2002 to 2005/2006 Hospital Morbidity Database.

(Table 4). Rate ratios, however, tended to be higher among females, indicating a greater difference compared with low-percentage Aboriginal areas. For instance, the RRs in high-percentage First Nations identity areas were 2.6 for females and 2.2 for males.

Rate ratios among females in high-percentage Aboriginal identity areas were particularly elevated (approximately 3.0 or more) for unintentional injury hospitalizations due to land transportation and drowning/suffocation. This was also the case for unintentional injury hospitalizations due to poisoning, cut/pierce, and fire in high-percentage First Nations and Métis identity areas, and due to natural/environmental causes in high-percentage First Nations and Inuit identity areas.

Discussion

This study reveals associations between the geographic areas where children and youth live and hospitalization for unintentional injury. Those in areas where at least 33% of residents reported Aboriginal identity were hospitalized at approximately twice the rate of their counterparts in low-percentage Aboriginal identity areas. Earlier studies based on provincial data[11,12,16] had similar results. For instance, First Nations children in Western Canada were reported to have injury hospitalization rates 1.2 to 2.9 times higher than those of the general population.[6] Similarly, First Nations children in Alberta were 1.4 times more likely to be hospitalized for an injury than were non-Aboriginal children.[16]

In the present analysis, ASHRs for injuries related to drowning/suffocation in high-percentage Aboriginal identity areas were approximately three times those in low-percentage Aboriginal identity areas. This is consistent with other research indicating that Aboriginal people are at increased risk of injuries due to drowning.[17] Even so, the overall ASHR for injuries due to drowning/suffocation was low, compared with causes such as falls and land transportation.

Unintentional injury hospitalization rates by cause differed among high-percentage First Nations, Métis and Inuit identity areas. ASHRs for injuries due to natural/environmental causes were highest in high-percentage Inuit identity areas, possibly reflecting conditions and activities specific to northern areas.[18] ASHRs for injuries due to fires were almost four times higher in high-percentage First Nations identity areas than in low-percentage Aboriginal identity areas, a finding consistent with earlier research.[6]

The RRs comparing unintentional injury hospitalizations in high- and low-percentage Aboriginal identity areas were often greater for females than males, a pattern reported in previous work.[11] Thus, although males were more likely to be hospitalized, the difference between residents of high- and low-Aboriginal identity areas was greater among females. In particular, RRs for females were greater for hospitalization for injuries due to poisoning and land transportation in high-percentage First Nations identity areas. Also, RRs for young children in high-percentage First Nations identity areas were greater than those for 10- to 19-year-olds for most causes of unintentional injury hospitalization.

Strengths and limitations

A strength of this study is the use of five years of national population-based data to examine rates and types of unintentional injury hospitalization for children and youth in high- and low-percentage Aboriginal identity areas, and the provision of breakdowns by injury type, age group and sex.

However, some limitations warrant discussion. Because Aboriginal identifiers were not available on the HMDB, a geographical proxy was used to designate census DAs as high- or low-percentage Aboriginal identity. Therefore, this is an ecological study reporting results for geographic areas; the associations observed do not necessarily apply at the individual level. As well, the geographic location where the injury occurred was not available.

A threshold of 33% was used to designate a DA as high-percentage Aboriginal identity.[10] For high-percentage Inuit identity areas, the 33% cut-off results in the selection of DAs with an average of 93% Aboriginal identity residents younger than age 20 (Appendix Table A). For high-percentage First Nations and Métis identity areas, the 33% cut-off results in the selection of DAs with 86% and 67% Aboriginal identity residents younger than age 20.[19] (A higher cut-point would have resulted in a substantial loss of high-percentage Métis identity areas.) Consequently, the findings are not representative of the First Nations, Métis, or Inuit identity populations in Canada.

High-percentage First Nations, Métis, and Inuit identity areas defined in this study differ in urban/rural location, population size, and socio-economic characteristics—all factors that have been associated with injury rates.[19,20] For example, 100% of the population living in high-percentage Inuit identity DAs were in weak or non-Metropolitan-Influenced zones, compared with 8% of the population in low-percentage Aboriginal identity DAs (Appendix Table A). Similarly, 27% of the population in high-percentage Inuit identity DAs lived in crowded dwellings, compared with 3% of the population in low-percentage Aboriginal identity areas. Also, information about individual and family characteristics such as income, education, and individual behaviours that may influence injury risk was not available on hospital records.

Previous research has found that injuries sustained among First Nations populations tend to be more severe.[8,12] Although the injuries included in this analysis were serious enough to result in hospitalization, the severity of those injuries was not assessed. And of course, injuries so severe that they resulted in death before hospital admission were not included in this analysis.

The results do not represent the entire country. Incomplete postal code

information for Quebec meant that the province had to be excluded from the study.

Finally, counts for some causes of injury for some Aboriginal identity groups were small.

Conclusion

Elevated rates of unintentional injury hospitalization among children and youth in high-percentage Aboriginal identity areas, compared with those in low-percentage Aboriginal identity areas, prevailed for all causes of injury examined in this analysis. While falls and land transportation injury hospitalizations were the most common, regardless of Aboriginal identity status, disparities between hospitalization rates for high- and low-percentage Aboriginal identity areas were often greatest for less frequent causes such as fire, natural/environmental causes, and drowning/suffocation. The extent of the difference in unintentional injury hospitalizations between high- and low-percentage Aboriginal identity areas varied, depending on whether the comparison was with high-percentage First Nations, Métis or Inuit identity areas. ■

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Appendix

Table A
Demographic and socio-economic census characteristics, by Aboriginal identity group in Dissemination Area, Canada (excluding Quebec), 2001

Characteristics	Low % Aboriginal	High % First Nations	High % Métis	High % Inuit
Total population	**19,137,200**	**338,500**	**49,000**	**31,800**
Aboriginal identity population (%)	3	77	57	87
Population aged 0 to 19 (%)	30	45	41	48
Population aged 0 to 19 of Aboriginal identity (%)	4	86	67	93
Population in weak or non-Metropolitan-Influenced Zone (%)	8	66	70	100
Population without secondary graduation (%)	30	53	45	52
Population not in labour force (%)	30	42	31	33
Population living in crowded dwellings (%)	3	21	10	27
Population in dwellings in need of major repair (%)	8	32	20	23
Average household income per person ($)	26,381	12,878	16,737	21,123

Notes: Dissemination Areas where at least 33% of the population reported Aboriginal identity are classified as high-percentage Aboriginal identity. Classification as high-percentage First Nations, Métis or Inuit is based on the predominant group.
Source: 2001 Census of Canada.